

What is claimed is:

1. A semiconductor device comprising:

a field effect transistor including:

a semiconductor layer formed on an insulator;

5 a gate insulating film formed on said semiconductor layer;

a gate electrode formed on said gate insulating film and extending in a first direction;

and

10 source/drain regions formed in said semiconductor layer on both sides of said gate electrode by heavily introducing a first conductivity type impurity;

a body contact region in which a second conductivity type impurity is heavily introduced into said semiconductor layer;

a partial isolating region in which a field insulating film thicker than said gate insulating film intervenes between said semiconductor layer and an extending portion of said gate electrode, and an impurity with the same conductivity type as said body contact region is introduced into said semiconductor layer; and

25 a full isolating region in which said semiconductor layer on said insulator is removed,

wherein said full isolating region is formed to

be in contact with at least a part of a side parallel to said first direction of said source/drain regions of said field effect transistor.

2. The semiconductor device according to claim 1, wherein said gate electrode comprises:

a first gate electrode layer having substantially a same thickness as said field insulating film; and  
5 a second gate electrode layer formed on said first gate electrode layer and extending over a carrier path.

3. The semiconductor device according to claim 2, wherein said first gate electrode layer and said second gate electrode layer are made of a material deposited in different processes.

4. The semiconductor device according to claim 3, wherein said first gate electrode layer and said second gate electrode layer are made of different materials.

5. The semiconductor device according to claim 1, wherein an impurity density in said semiconductor layer in a part of said partial isolating region contiguous to a device region in which said field  
5 effect transistor is provided is lower than an

impurity density in said semiconductor layer in the other part of said partial isolating region.

6. The semiconductor device according to claim 1, wherein an impurity density in said semiconductor layer in a part of said partial isolating region contiguous to a device region in which said field  
5 effect transistor is provided is lower than an impurity density in said semiconductor layer in the other part of said partial isolating region and is the same as an impurity density in said semiconductor layer in said device region.

7. The semiconductor device according to claim 2, wherein an impurity density in said semiconductor layer in a part of said partial isolating region contiguous to a device region in which said field  
5 effect transistor is provided is lower than an impurity density in said semiconductor layer in the other part of said partial isolating region and is the same as an impurity density in said semiconductor layer in said device region.

8. The semiconductor device according to claim 1, wherein said full isolating region is formed to be in contact with the whole sides parallel to said first direction of said source/drain regions of said field

5 effect transistor.

9. The semiconductor device according to claim 1,  
wherein said full isolating region is formed to be in  
contact with the whole sides parallel to said first  
direction of said source/drain regions of said field  
5 effect transistor and a part of a side perpendicular  
to said first direction of said source/drain regions.

10. The semiconductor device according to claim 1,  
wherein only said full isolating region is provided  
between adjacent said field effect transistors.

11. The semiconductor device according to claim 1,  
wherein said full isolating region is formed to be in  
contact with a part of a side parallel to said first  
direction of said source/drain regions of said field  
5 effect transistor and the whole of one side  
perpendicular to said first direction of said  
source/drain regions.

12. The semiconductor device according to claim 1,  
wherein a plurality of said field effect transistors  
are provided in one block surrounded by said full  
isolating region.

13. The semiconductor device according to claim 1,

wherein a p-channel type said field effect transistor and a n-channel type said field effect transistor are provided in different blocks surrounded by said full  
5 isolating region, respectively.

14. The semiconductor device according to claim 1, wherein a plurality of p-channel type said field effect transistors and a plurality of n-channel type said field effect transistors are provided in  
5 different blocks surrounded by said full isolating region, respectively.

15. The semiconductor device according to claim 1, wherein said full isolating region defining a block including a plurality of said field effect transistors is formed to be in contact with a side of said  
5 source/drain regions.

16. The semiconductor device according to claim 1, wherein said full isolating region defining a block including one said field effect transistor is formed to be in contact with a side of said source/drain  
5 regions.

17. A method for manufacturing a semiconductor device comprising:

(a) forming a CMP (Chemical Mechanical Polishing)

mask to cover a device region and a body contact  
5 region on a semiconductor layer on an insulator, said  
CMP mask being composed of an upper mask layer  
resistant to a CMP and a lower mask layer made of a  
conductive material or a material which is made  
conductive by introducing impurity;

10 (b) introducing a second conductivity type  
impurity into at least a portion of said semiconductor  
layer which is not covered by said CMP mask, said  
second conductivity type impurity is different from an  
impurity which is to be introduced into source/drain  
15 regions;

(c) forming a full isolating region by removing  
said semiconductor layer on said insulator in a part  
of a region contiguous to said CMP mask;

(d) forming wholly a second insulating film  
20 different from a material of said CMP mask and  
planarizing said second insulating film by a CMP;

(e) removing said upper mask layer of said CMP  
mask and forming an upper gate electrode layer made of  
a conductive material or a material which is made  
25 conductive by introducing impurity;

(f) removing said upper gate electrode layer and  
said lower mask layer of said CMP mask in said body  
contact region and a part of said device region, to  
form a gate electrode composed of a residual of said  
30 upper gate electrode layer and said lower mask layer

of said CMP mask and extending in a first direction;  
and

(g) forming source/drain regions in said  
semiconductor layer on both sides of said gate  
35 electrode to form a field effect transistor,

wherein said full isolating region is formed to  
be in contact with at least a part of a side parallel  
to said first direction of said source/drain regions  
of said field effect transistor.

18. The method for manufacturing a semiconductor  
device according to claim 17, said (d) forming is  
carried out after said (c) forming.

19. The method for manufacturing a semiconductor  
device according to claim 17, said (c) forming is  
carried out after said (d) forming.

20. A method for manufacturing a semiconductor device  
comprising:

(h) forming a CMP (Chemical Mechanical Polishing)  
mask to cover a device region and a body contact  
5 region on a semiconductor layer on an insulator, said  
CMP mask being composed of an upper mask layer  
resistant to a CMP and a lower mask layer made of a  
conductive material or a material which is made  
conductive by introducing impurity;

10       (i) introducing a second conductivity type  
impurity into at least a portion of said semiconductor  
layer which is not covered by said CMP mask, said  
second conductivity type impurity is different from an  
impurity which is to be introduced into source/drain  
15 regions;

      (j) forming wholly a second insulating film  
different from a material of said CMP mask and  
planarizing said second insulating film by a CMP;

      (k) removing said upper mask layer of said CMP  
20 mask and forming an upper gate electrode layer made of  
a conductive material or a material which is made  
conductive by introducing impurity;

      (l) removing said upper gate electrode layer and  
said lower mask layer of said CMP mask in said body  
25 contact region and a part of said device region, to  
form a gate electrode composed of a residual of said  
upper gate electrode layer and said lower mask layer  
of said CMP mask and extending in a first direction;

      (m) forming source/drain regions in said  
30 semiconductor layer on both sides of said gate  
electrode to form a field effect transistor;

      (n) covering said field effect transistor by an  
interlayer insulating film and planarizing said  
interlayer insulating film; and

35       (o) forming a full isolating region by removing  
said semiconductor layer in a part of a region



contiguous to said source/drain regions;

wherein said full isolating region is formed to be in contact with at least a part of a side parallel  
40 to said first direction of said source/drain regions of said field effect transistor.

21. The method for manufacturing a semiconductor device according to claim 17, wherein said CMP mask is a multiple-layer including a  $\text{Si}_3\text{N}_4$  film as a top layer.

22. The method for manufacturing a semiconductor device according to claim 17, wherein said CMP mask is a multiple-layer including a  $\text{SiO}_2$  film as a top layer and a  $\text{Si}_3\text{N}_4$  film as a second layer under said top  
5 layer.

23. The method for manufacturing a semiconductor device according to claim 17, wherein said CMP mask is a multiple-layer including a  $\text{Si}_3\text{N}_4$  film as a top layer and a polysilicon film as a second layer under said  
5 top layer.

24. The method for manufacturing a semiconductor device according to claim 17, wherein said CMP mask is a multiple-layer including a  $\text{Si}_3\text{N}_4$  film as a top layer, a  $\text{SiO}_2$  film as a second layer under said top

5 layer, and a polysilicon film as a third layer under said second layer.

25. The method for manufacturing a semiconductor device according to claim 17, wherein said (b) introducing is carried out such that said second conductivity type impurity is the same as an impurity 5 which is to be introduced into said semiconductor layer in said body contact region.

26. The method for manufacturing a semiconductor device according to claim 17, wherein materials of said lower mask layer of said CMP mask and said upper gate electrode layer are polysilicon.

27. The method for manufacturing a semiconductor device according to claim 17, wherein said upper gate electrode layer is a multiple-layer made of a conductive material or a material which is made 5 conductive by introducing impurity.

28. The method for manufacturing a semiconductor device according to claim 17, wherein said lower mask layer of said CMP mask is made of polysilicon and said upper gate electrode layer is made of metal.

29. The method for manufacturing a semiconductor

device according to claim 17, wherein a side wall is formed next to said CMP mask after said (a) forming, and said (b) introducing is carried out such that said  
5 second conductivity type impurity is introduced into at least a portion of said semiconductor layer which is not covered by said CMP mask and said side wall.

17 30. A semiconductor device which has a transistor, comprising:

a semiconductor layer formed on an insulating film;

5 an active region formed in said semiconductor layer, said active region including a source region, a drain region and a channel region between said source region and said drain region;

a gate electrode formed over said channel region  
10 and extending in a first direction;

a body contact region formed in said semiconductor layer apart from said active region;

a carrier path formed in said semiconductor layer to connect said active region and said body contact  
15 region;

a first isolating region formed on said insulating film to be in contact with at least one of a first side of said source region parallel to said first direction and a second side of said drain region  
20 parallel to said first direction; and

a second isolating region extending from said first isolating region over said carrier path,

wherein said semiconductor layer in said carrier path has substantially a same thickness as said  
25 semiconductor layers in said active region and said body contact region.